Luminescence spectra of TeO_2-PbO-Li_2O doped Nd_2O_3 glass

Abstract :

A tellurite glass of TeO_2-PbO-Li_2O doped with Nd_2O_3 has been successfully fabricated by using the conventional melt-quenched technique. The absorption and emission spectroscopy have been identified using UV-VIS-NIR and photoluminescence spectrometer, respectively. From the spectroscopy, ten significant spectra have been observed in the region of 400-900 nm. The absorption wavelength centered at 585 nm attributed to $^4I_{9/2} \rightarrow {}^4G_{5/2}$ transition is the predominant wavelength to be used as the excitation wavelength. Emission spectra have been determined by using 585 nm excitation wavelength at room temperature. From the emission spectra, seven distinctive upconversion bands contributed from Nd^{3+} were observed in the region of 400-1500 nm. It was found that the bands were centered at 450 nm ($^4G_{11/2} \rightarrow {}^4I_{9/2}$), 485 nm ($^4G_{11/2} \rightarrow {}^4I_{11/2}$), 605 nm ($^4G_{11/2} \rightarrow {}^4I_{15/2}$), 665 nm ($^4G_{7/2} \rightarrow {}^4I_{13/2}$), 880 nm ($^4F_{3/2} \rightarrow {}^4I_{9/2}$), 1062 nm ($^4F_{3/2} \rightarrow {}^4I_{11/2}$) and 1340 nm ($^4F_{3/2} \rightarrow {}^4I_{11/2}$), respectively. These emission bands showed the possibility of visible and near infrared emission spectra.